

**What Is Claimed Is:**

1           1. A lightweight fuel tank comprising:  
2           an outer spherical shell member;  
3           a second inner spherical shell member positioned inside said  
4           outer shell member;  
5           an inner shell member and said outer shell member being  
6           positioned to provide an insulating radial gap between them;  
7           said inner shell member having an outer surface and an inner  
8           surface, said outer surface being coated with a low emissivity material; and  
9           said outer shell member having an outer surface and an inner  
10          surface, said inner surface being coated with a low emissivity material.

1           2. The light weight fuel tank as set forth in claim 1 further  
2           comprising a first heating mechanism on said outer shell member for controlling  
3           the rate of evaporation of hydrogen material contained in said inner shell  
4           member.

1           3. The light weight fuel tank as set forth in claim 1  
2           comprising a second heating mechanism on said outer surface of said outer shell  
3           member for controlling icing of said fuel tank during use.

1           4. The light weight fuel tank as set forth in claim 1 wherein  
2           said outer shell member is a sandwich construction employing low heat  
3           conducting skin and core materials.

1           5. The light weight fuel tank as set forth in claim 1 wherein  
2           said inner shell member is made of an aluminum material and said outer shell  
3           member is made of a sandwich of titanium, Kevlar and Nomex materials.

1           6. The light weight fuel tank as set forth in claim 1 wherein  
2           said low emissivity material is a flash of a copper material.

~~1           7. The light weight fuel tank as set forth in claim 1 further~~  
~~2 comprising a first port member in said outer shell member for evacuation of~~  
~~3 said radial gap to a vacuum, and provide access for filling said inner shell~~  
~~4 member with hydrogen material.~~

1                   8. The light weight fuel tank as set forth in claim 1 further  
2 comprising a second port member in said inner shell member for filling said  
3 inner shell member with a hydrogen material, said second port member having a  
4 valve mechanism.

1                   9. The light weight fuel tank as set forth in claim 1 further  
2 comprising a third port member in said inner shell member, said third port  
3 member having a valve mechanism.

1                   10. The light weight fuel tank as set forth in claim 1 wherein  
2 said inner and outer shell members are connected at three locations, namely two  
3 opposing equatorial external support positions and a port member.

2                   11. The light weight fuel tank as set forth in claim 10  
3 wherein said inner and outer shell members of different materials are connected  
4 by a friction welded insert member.

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